Flavor Preferences for Butter and Margarine [1, 2]

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Abstract

A significant preference for high-quality sweet-cream butter over several commercial brands of margarine was observed when evaluated by a large college-student panel. Salt levels from 0.54 to 1.86% were preferred by the student panel. Significant flavor preferences were not found for butters prepared from aliquots of one lot of cream repasteurized at 76.6 for 1,800 sec and the other at about 96.0 C for 7,200 sec. The distribution of preference scores on a nine-point scale varied widely among the spreads tested.

In recent years margarine has become a popular substitute for butter, mainly because it is much lower in price (4). Butter, however, is generally conceded to have a more appealing flavor, and is thus served as the premium quality spread.

In our work, college-student flavor panels were used to study several factors pertaining to butter and margarine preferences. These were: the preferred salt content, the relative preference for butters from different sources, the preference of high-quality butter relative to several kinds of commercial margarine (dissimilar in price and in their fat base), and possible differences in butter flavor between butters prepared from lots of cream receiving different pasteurization treatments.

Experimental Procedure

Flavor panels. Flavor preference panels were conducted and the data analyzed as described by Calvin and Sather (1). The size of panels ranged from 134 to 176 students, who were chosen on a first-come, first-serve basis; thus, the judges did not necessarily have higher than average taste acuity or previous experience. For a given test, each judge was served from three to five coded butter or margarine samples, kept at 10 C before serving, and a hot roll. The judges scored the test samples on a nine-point hedonic scale. A smaller preference panel consisting of 19 staff members of the Food Science Department at Oregon State University was used for one test.

Test samples. Descriptions of the butters tested are given in Table 1. The butter obtained from the Oregon State University Dairy Products Laboratory was made from fresh, pasteurized sweet cream. Commercial sweet-cream butters were purchased from local food markets, selecting high-quality samples with the same lot numbers (i.e., from the same churning) for each separate test. The four brands of margarine used are described in Table 2. Butter and margarine samples were obtained directly from the food markets as required during one and one-half years.

Aliquots of the butter and margarine were assayed for sodium chloride by titration with silver nitrate (3).

Results and Discussion

Results of the flavor preference tests are summarized in Tables 3-6. Samples in Tests 1, 2, and 3 contained different levels of salt (Table 3). Each sample was churned in the University Dairy Products Laboratory from the same batch of pasteurized sweet cream.

TABLE 1. Types of sweet-cream butter evaluated by student flavor panels.

Butter	NaCl (w/w)	Cream pasteurization	
		Temp	Time
	(%)	(C)	(sec)
Commercial butters			
A-1	0.09[a]	87.7	About 25
A-2	1.73	87.7	About 25
B	2.40	93.3-96	About 1
University dairy products laboratory butters			
1	0.05[b]	76.6	1,800
2	0.54	76.6	1,800
3	1.00	76.6	1,800
4	1.33	76.6	1,800
5	1.86	76.6	1,800
6	2.40	76.6	1,800
7	1.00	93.3-98.8	7,200

[a] Sold as unsalted butter.
[b] Churned as unsalted butter.

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TABLE 2. Types of margarine evaluated by student flavor panels.

Brand	Price (cents/lb)	NaCl (w/w) (%)	Type of fat base[a]
W-1	0.49	1.86	Liquid corn oil
W-2	0.53	0.09	Liquid corn oil (no preservative)
X	0.49	2.08	Partially hydrogenated vegetable oils and liquid corn oil
Y	0.20	2.43	Hardened lard and soybean oil
Z	0.34	1.78	Partially hydrogenated soybean and cottonseed oil

[a] All margarines also contained dry milk, artificial flavor, emulsifier, coloring, vitamin A, and preservative. Brands Y and Z were displayed as nonrefrigerated products; other brands were refrigerated during market display.

The judges indicated a preference for moderately salted (0.54, 1.33, or 1.86%) butters, whereas heavily salted (2.40%) and unsalted (0.05%) butters were scored lower.

Salted commercial brands of butter and margarine scored more than two hedonic units higher than their unsalted counterparts (Table 4, Test 4). While salted butter (A-2) scored significantly higher than the salted margarine (W-2), the three unsalted spreads in Test 5 all scored very near the middle of the hedonic scale (neither like nor dislike). Thus, flavor advantages of butter over margarine were nullified when salt was excluded.

A relatively high-priced commercial butter, Brand B, scored higher than the two butters made in the University Dairy Products Laboratory (Test 6). The different pasteurization temperatures employed for the creams did not have a detectable effect on the flavor preference of Butters 3 and 7, as they scored the same (Table 1). This result, again observed in Test 7, is of interest, because it has been found that the methyl ketone and lactone contents in butter depend on intensity of the heat treatment (2, 5). Butter 7, therefore, had a higher lactone and methyl ketone concentration than did Butter 3.

Butter scored significantly higher than all the margarines in Tests 7 through 10. Higher-priced margarines scored better than lower-priced margarines in Test 10, although prices and hedonic scores of the margarines were not in exact parallel order. In this series of tests, butter made in the University Dairy Products Laboratory usually scored lower than that obtained from commercial sources. This was attributed by the expert butter tasters to the

TABLE 3. Mean hedonic scores of butters made in the University Dairy Products Laboratory containing different levels of sodium chloride.

Test no.	Butter sample no.[a]	NaCl (w/w) (%)	Mean score[b]	LSD at 0.05 level
1	4	1.33	6.71	0.35 for 149 judges
	2	0.54	6.48	
	6	2.40	6.07	
	1	0.05	4.67	
2	5	1.86	6.52	0.37 for 146 judges
	2	0.54	6.37	
	6	2.40	5.71	
	1	0.05	4.56	
3	5	1.86	6.56	0.33 for 145 judges
	4	1.33	6.45	
	2	0.54	6.21	
	1	0.05	4.15	

[a] From Table 1.
[b] Score from 9, like extremely, to 1, dislike extremely; a score of 5 is neither like nor dislike.

TABLE 4. Mean hedonic scores of different types of butters and margarines.

Test no.	Sample[a]	Mean score[b]	LSD at 0.05 level
4	Butter A2, 1.73% salt	6.55	0.39 for 142 judges
	Margarine W-1, 1.86% salt	6.01	
	Butter A-1, unsalted	3.82	
	Margarine W-2, unsalted	3.57	
5	Butter A-1, unsalted	5.05	0.29 for 163 judges
	Butter 1, unsalted	4.98	
	Margarine W-2, unsalted	4.74	
6	Butter B	6.80	0.33 for 151 judges
	Butter 3	6.36	
	Butter 7	6.36	
7	Butter B	6.94	0.32 for 169 judges
	Butter 3	5.78	
	Butter 7	5.71	
	Margarine Y	5.29	
8	Butter A-2	6.92	0.34 for 149 judges
	Butter 7	6.69	
	Margarine Y	5.99	
9	Butter B	6.53	0.40 for 134 judges
	Butter 4	5.75	
	Margarine W-1	5.17	

[a] From Tables 1 and 2.
[b] As in Table 3.

TABLE 5. Comparison of student and staff member flavor preferences for several butters and margarines.

Test no.	Sample[a]	Mean score[b] Student	Staff
10	Butter B	6.75	7.11
	Margarine W-1	6.32	5.47
	Margarine X	5.95	5.26
	Margarine Y	5.36	5.00
	Margarine Z	5.12	3.89
	LSD at 0.05 level	0.33	1.06
	No. of judges	176	19

[a] From Tables 1 and 2.
[b] As in Table 3.

TABLE 6. Percentage of tasters showing strong likes and dislikes for various butters and margarines.[a]

Test no.[c]	Sample[b]	Dislike	Like
		(%)	
3	Butter 1, (unsalted)	23	2.7
3	Butter 5	2.8	36
7	Butter 3	1.8	13
7	Margarine Y	6.5	12
10[d]	Margarine Y	26	5.6
10	Butter B	4.0	42
10	Margarine W-1	2.9	29
10	Margarine X	3.4	21
10	Margarine Y	5.7	8.6
10	Margarine Z	8.0	8.6

[a] Per cent dislike includes the fraction of judges selecting the last two numbers on the hedonic scale, meaning dislike very much or dislike extremely. Per cent like is the fraction of judges selecting the highest two numbers on the hedonic scale, meaning like very much or like extremely.
[b] Samples are described in Tables 1 and 2.
[c] Test number given in Tables 3, 4, and 5.
[d] Staff panel. Other tests no. 10 refer to student panels.

presence of a slight oxidized off-flavor in these samples.

The staff panel (Table 5) indicated stronger likes and dislikes than students, but ranked the spreads in the same order. These conclusions are only indicative, since the least significantly different (LSD) for the small staff panel is quite large.

A factor of considerable importance economically is the degree of like or dislike for the different spreads. Table 6 shows percentages of tasters revealing pronounced likes and dislikes for various samples. Less than 3% of the students liked unsalted butter and the value for higher-priced unsalted margarine was approximately the same. The percentage of student tasters indicating strong dislikes for all salted spreads was $\leq 4\%$, except for the lowest-priced margarines.

Fig. 1 illustrates the entire distribution of scores for several spreads at each of the nine descriptive hedonic levels [these levels are given by Calvin and Sather (1)]. Differences between spreads are more evident at the like and dislike ends of the scale than in the middle. Fig. 1 demonstrates that on a flavor preference basis, among college students, butter is preferred over margarine.

References

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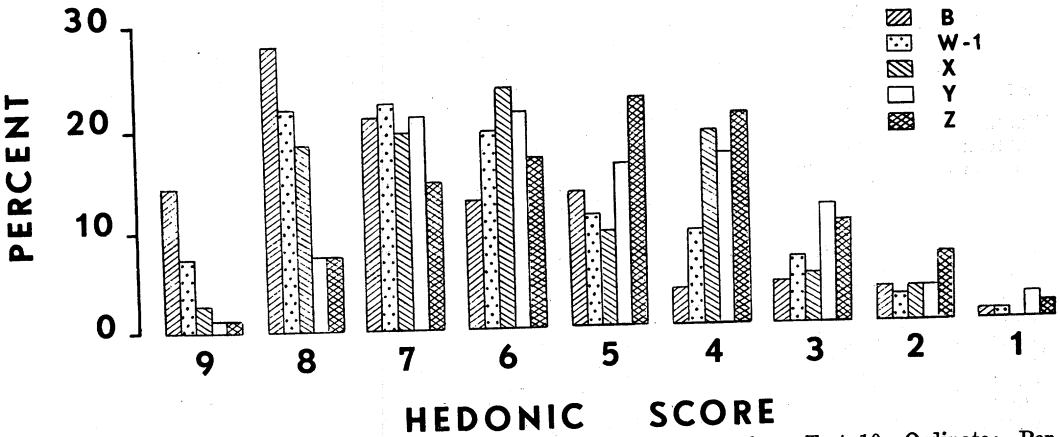

FIG. 1. Distribution of hedonic scores for butter and four margarines from Test 10. Ordinate: Percentage of judges selecting hedonic score.
Abscissa: Hedonic score from nine, like extremely, to one, dislike extremely.

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